



Secondary aerosol formation in the planetary boundary layer: observations on board on a Zeppelin and analysis by back plume approach

Konstantinos Kazanas (1,2), Florian Rubach (1,3), Ralf Tillmann (1), Thomas Mentel (1), Hendrik Elbern (1,2), Andreas Wahner (1), and Zeppelin PEGASOS-Team 2012 (1)

(1) FZ-Juelich, IEK-8, Juelich, Germany (t.mentel@fz-juelich.de), (2) Rhenish Institute for Environmental Research (University of Cologne), Koeln, Germany (kkazanas@uni-koeln.de), (3) Now: Max Planck Institute for Chemistry, Mainz, Germany florian.rubach@MPIC.de)

The airship Zeppelin NT is an airborne platform capable of flying at low speed throughout the entire planetary boundary layer (PBL), thus the Zeppelin is an ideal platform to study regional processes in the lowest layers of the atmosphere with high spatial resolution. Atmospheric aerosol as a medium long lived tracer substance is of particular interest due to its influence on the global radiation budget. Due to its lifetime of up to several days secondary aerosol at a certain location can result from local production or from transport processes.

Flight patterns during the PEGASOS campaign 2012 in the Po Valley included vertical profiles and transects through regions of interest. We analysed one flight with North-South transects between the Apennin and San Pietro Capofiume and one flight with vertical profiles near the supersite San Pietro Capofiume to shed light on local production and transport processes.

Model analyses were performed by using 12 hour back plumes for selected points of measurements to determine the regions which contributed to the air mass under observation.

This analysis was done using the EUROpean Air pollution Dispersion and Inverse Modelling (EURAD-IM) system. As a novel method, adjoint (backward) plumes are applied to identify the spread of originating air masses in terms of horizontal and vertical extension, and the influence of precursor species. Flight patterns include 5 points of measurement along the transect on 21.06.2012 and the lowest (ca. 80m), highest (ca. 708m), and medium height (299 to 464m) of 7 vertical profiles on the 20.06.2012.